Sagittar

SGT-LD-55-23
LD IP Radio Link

User Manual

Copyright

About This Manual

This user manual is intended to guide a professional installer to install the SGT-LD-55-23 and how to build the infrastructure around it.   It includes procedures to assist you to avoid unforeseen problems.

Conventions

For your attention on important parts, special characters and patterns are used in this manual:

Note:

- This indicates an important note that you must pay attention to.

Warning:

- This indicates a warning or caution that you have to abide.

Bold: Indicates the function, important words, and so on.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.　These limits are designed to provide reasonable protection against harmful interference in a residential installation.　This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.　However, there is no guarantee that interference will not occur in a particular installation.　If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. To avoid the possibility of exceeding radio frequency exposure limits, you shall keep a distance of at least 100cm between you and the antenna of the installed equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.

Content

FIGURE

TABLE

Chapter 1 Introduction

Introduction

The SGT-LD-55-23 is a high-performance outdoor-deployable wireless bridge that provides wireless connectivity among multiple network locations.   The SGT-LD-55-23 has a built-in 23dBi panel antenna that can deliver up to a 40Km connection (and beyond with reducing throughput).   An external antenna may also be used to improve signal quality and improve distance.   The SGT-LD-55-23 allows for link aggregation by combining multiple links into one link with a higher transmission rate.

The SGT-LD-55-23 is a multi-function communication device that supports Base Station, CPE, PTP and PTMP connectivity.   It allows local area network (LAN's) in different locations (buildings) to be easily interconnected.   The SGT-LD-55-23 delivers "last mile" broadband connectivity through its PTP and PTMP capabilities.

The SGT-LD-55-23 can be operated in PTP mode for one card and on bridge in another.   And use of an external omni antenna for the bridge side may provide users with flexibility in various local coverage applications.

With high throughput and long-distance transmission, the SGT-LD-55-23 is an ideal backhaul solution for Carriers, Service Providers and Enterprises.

Appearance

Figure 1 SGT-LD-55-23

Key Features

- Provide easy installation and high performance wireless connectivity

- IP67 waterproof housing endures almost any harsh environments

- Multiple operating modes including Base station, CPE, PTP and PTMP

- Support 64/128-bit WEP and 802.1X, WPA-PSK, WPA2-PSK and WPA-PSK&WPA2-PSK, etc

- Support WMM and Quality of service (QoS) for enhanced performance

- Proprietary Antenna Alignment Tool helps identify the antenna orientation with the best signal strength

- Link aggregation combines multiple links into one with higher transmission rate

- Buzzer design helps to determine the device power initial condition

- Super mode to boost the data rate up to 108Mbps

- Advanced management tools like SNMP and Secure Shell (SSH)

- User-friendly Web, SSH and SNMP-based management interface

Typical Applications

This section describes typical applications of the SGT-LD-55-23.

Telemedicine Broadband Wireless Application

The SGT-LD-55-23 primary usage is as a relay or bridging technology that may be combined with a cost effective solar power solution allowing for telemedicine application in remote and rural environments.   The SGT-LD-55-23 is able to deliver stable and high performance broadband connectivity for typical telemedicine applications in a Line-of-Sight environment.

Figure 2 Telemedicine Wireless Broadband

Education Broadband Wireless Application

Schools in remote or rural areas can be provided with broadband connectivity via local Internet service providers.   The relay ability of the SGT-LD-55-23 allows for multiple hops to be made, thus allowing the SGT-LD-55-23 to reach more remote LOS locations beyond 40Kms or to circumvent natural obstructions like mountains.
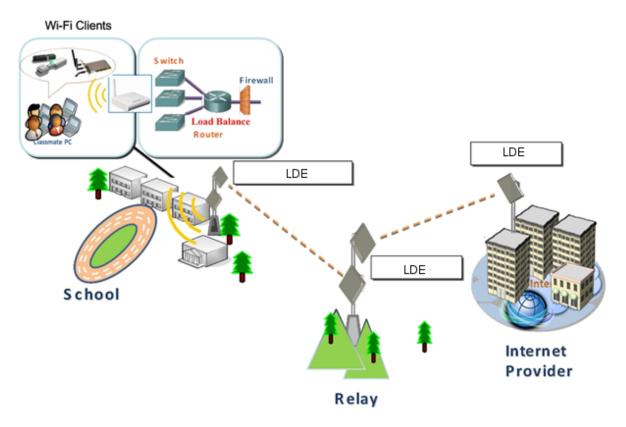
Figure 3 Campus Wireless Broadband

Additionally, the SGT-LD-55-23 can also be applied for the following environments:

- Cost-effectively provide long distance backhaul for remote areas (e.g. village, oil well, island, mountain etc.)

- Establish local backhaul for campus, farm and factory

- Provide access for video streaming or surveillance for industrial and mining enterprises

- Operates as a relay connecting different networks

Chapter 2 Hardware Installation

This chapter describes safety precautions and product information you have to know and check before installing a SGT-LD-55-23.

Preparation before Installation

Professional Installation Required

1. Please seek assistance from a professional installer who is well trained regarding RF installation and knowledgeable regarding the local regulations.

2. The SGT-LD-55-23 is provided through distribution to system installers who employ services of trained professional technicians – the SGT-LD-55-23 is not sold directly through retail stores.

3. The equipment shall be installed in RESTRICTED ACCESS LOCATIONS.   Access can only be gained by service persons or by users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.   Furthermore, access is through the use of a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.

4. If you are intending to use an external antenna with the SGT-LD-55-23, please contact your supplier/installer to ensure that your unit is setup for you have fulfilled all the local regulatory requirements.   It is the responsibility of the installer/user to check that the equipment as deployed meets local regulatory requirements.

Safety Precautions

To ensure your safety and to install the hardware properly, please read and follow these safety precautions.

- ONLY qualified service personnel should service or disassemble this device;
- When installing the device, note the followings:
  - Do NOT use a metal ladder;
  - Do NOT work on a windy or raining day;
  - Do NOT install, use or service the device during a thunderstorm, as this may cause a remote risk of electric shock from lightning;
  - Wear shoes with rubber soles and heels, rubber gloves, long sleeved shirt or jacket.
  - When the system is operational, avoid standing directly in front of the antenna. Strong RF fields are present when the transmitter is on.
- Ground the device properly with grounding wire to protect against lightning;
- Use ONLY appropriate accessories for the device.
- If the temperatures of the unit surface exceeds the limit, be precautious not to continuous hold or touch the device for a certain period of time.

Installation Precautions

To keep the SGT-LD-55-23 in good condition when you are installing it, please read and follow these installation precautions.
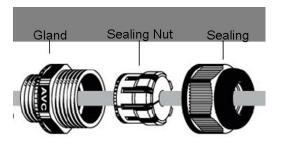
1. Users MUST use a proper and well-installed surge arrestor and grounding kit with SGT-LD-55-23; otherwise, a random lightning could easily cause fatal damage to SGT-LD-55-23. **EMD (Lightning) DAMAGE IS NOT COVERED UNDER WARRANTY.**

2. Make sure the PoE is correctly connected to the RJ-45 port on the SGT-LD-55-23 labelled PoE+Data. **DO NOT CONNECT TO THE PORT LABELED "Warning!! No POE"**, otherwise the SGT-LD-55-23 will be severely damaged!

3. Users MUST power off the SGT-LD-55-23 first before connecting the external antenna to it; otherwise, damage might be caused to the SGT-LD-55-23 itself.

Waterproof RJ-45 Connector Kit

1. Gland   ×1
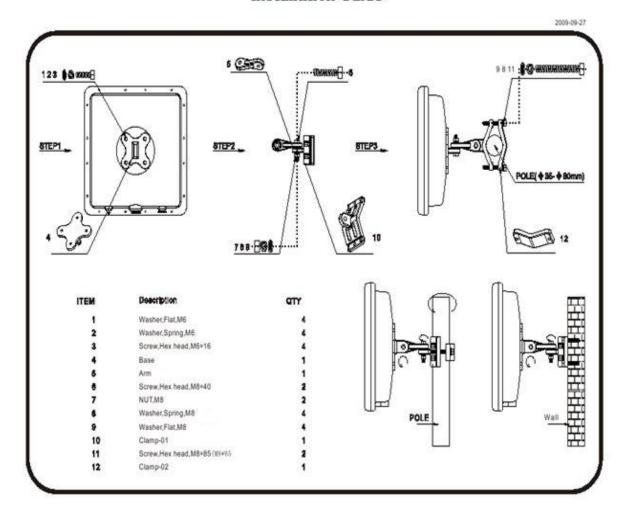
2. Sealing Nut   ×1

3. Sealing   ×1

Gland   Sealing Nut   Sealing

Hardware Installation

Installation Guide

2009-09-27

ITEM	Description	QTY
1	Washer,Flat,M6	4
2	Washer,Spring,M6	4
3	Screw,Hex head,M6*16	4
4	Base	1
5	Arm	1
6	Screw,Hex head,M8*40	2
7	NUT,M8	2
8	Washer,Spring,M8	4
9	Washer,Flat,M8	4
10	Clamp-01	1
11	Screw,Hex head,M8*85	2
12	Clamp-02	1

Interface Definition

The SGT-LD-55-23 currently provides two interfaces at the bottom, which are PoE + Data with a black plastic cover and RS-232 with a light gray cover that label "**WARNING! No PoE**".   Amongst which, a black RJ45 waterproof connector will be provided for the PoE + Data interface.

Figure 4 Interface Definition

RS-232

RS-232, which is labeled **COM/RESET**, is used for debugging purposes as well as for hard reset of the

SGT-LD-55-23.   Below you may find the pin definition of the RS-232.

Table 1 PIN Definition

Pin Assignment	Name	Description
P1	TXD0	Data Transmit 0
P2	DSR0	Data Set Ready 0
P3	RXD0	Data Receive 0
P4	TXD1	Data Transmit 1
P5	RXD1	Data Receive 1
P6	DTR1	Data Terminal Ready
P7	Hard Reset	Hard reset the unit
P8	GND	Ground

To reset the device, short P7 (Hard Reset) to P8 (GND) for less than 1 second and the system will

reset.   If P7 (Hard Reset) is shorted to P8 (GND) for over 5 seconds, the SGT-LD-55-23 LD will be

reset to the factory default settings.
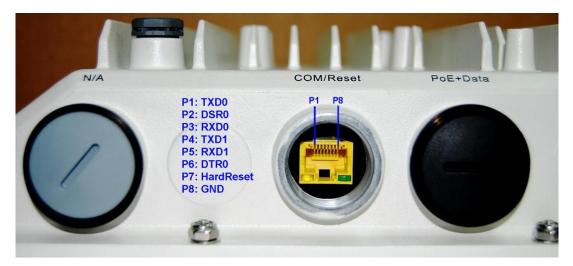
Figure 5 Detailed View of RS-232 Port

Above are the views of RS-232 cover and RJ-45 port respectively, please note the label coverings and

DO strictly follow the instructions to avoid damaging your equipment!

Figure 6 Warning Label

⚠️ **Warning:**

- Do NOT connect PoE powered Ethernet cable to the RS-232 port; otherwise the port

  may be damaged.

- If RS-232 cable is used outdoors, please DO add a surge protector to protect the

  equipment circuit!

- It is strongly recommended to add a lightning arrestor on the RS-232 port to prevent

  lightning damage.

Vent

The vent is designed to facilitate vapor and moisture egress out of the unit as well as to repel water,

dust and dirt by using the specially designed membrane, thereby preventing the SGT-LD-55-23 from

electric malfunctioning.
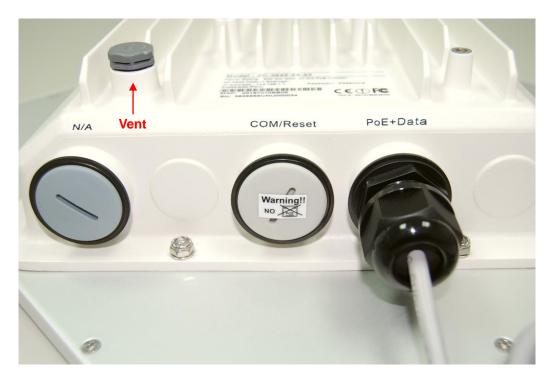
Figure 7 Vent

Connect Up

Before installing the Ethernet cable with a waterproof RJ-45 connector, it is recommended that the Cat-5 RJ-45 coaxial cable be used for the SGT-LD-55-23 to power PoE connector.

1. To connect to the hole labelled **PoE+Data**, open the black cover in advance by using a coin or a slotted screwdriver and then screw in the body of the gland and tighten.

Figure 8 Connect Up – Step 1

2. Slide the sealing nut to the RJ-45 cable from its middle breach and then insert the sealing into the cable.

Slide the Sealing Nut from its Breach
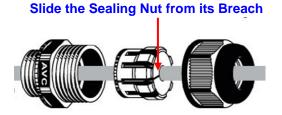
Figure 9 Connect Up – Step 2

3. Insert the RJ-45 connector and make sure that the locking tab snaps home.

SGT-LD-55-23 RJ-45 Port   **Figure 10 Connect Up – Step 3**

4. Screw the sealing on the gland and tighten.

Figure 11 Connect Up – Step 4

Grounding

The SGT-LD-55-23 is shipped with a grounding wire. The unit must be properly grounded to protect against power surges.   The grounding point can be found on the bottom of the unit.   It is supplied with an appropriate grounding lug for attachment to the ODU.

Figure 12 Grounding

Power On

To power up the SGT-LD-55-23, follow the steps below:

1. Plug a user-supplied Cat-5 Ethernet cable from your wired LAN (or a computer) into the power injector RJ-45 jack (**DATA IN**);

2. Plug a user-supplied Cat-5 Ethernet cable from the SGT-LD-55-23 into the power injector RJ-45 jack (**P+DATA OUT**);

3. Connect the power module to the power injector and plug the AC cord into an AC power receptacle;

4. After being powered on, the device will send out a beep sound lasting about 1.5 seconds, informing you that the SGT-LD-55-23 is powered up! Wait about 60 seconds - system will be initialized and start working.

Figure 13 PoE Connection

⚠️ **Warning:**

- Make sure the PoE is correctly connected to the RJ-45 port to the SGT-LD-55-23 labelled PoE+Data, otherwise the SGT-LD-55-23 will be severely damaged!

- When installing the secondary antenna, please make sure to power off the device to prevent unexpected damage.

Chapter 3 Basic Settings

Factory Default Settings

We'll elaborate on the SGT-LD-55-23 factory default settings. You can re-acquire these parameters by default.   If necessary, please refer to the "Restore Factory Default Settings".

Table 2 SGT-LD-55-23 Factory Default Settings

Features		Factory Default Settings
Username		admin
Password		password
Wireless Device Name		DEVICEXXXXXX (X represents the last 6 digits of Ethernet MAC address)
Operating Mode		Peer-to-Peer (CSMA)
Country/Region		United States (Country dependent and software programmed)
Ethernet Data Rate		Automatic
LAN	IP Address	192.168.1.1
	Subnet Mask	255.255.255.0
	Gateway	0.0.0.0
	Primary DNS Server	0.0.0.0
	Secondary DNS Server	0.0.0.0
DHCP Client		Disable
Spanning Tree		Enable
Link Aggregation		Disable
Wireless Mode		802.11a
Channel/Frequency		149/5.745GHz (CE: 100/5.5GHz)
BSSID		wireless
Transmit Rate		Best
Output Power		100% (Full)
Bandwidth		20MHz
TDM Coordination		Disable
WMM		Disable
Super Mode		Disable
RTS Threshold (byte)		2346
Fragmentation Length (byte)		2346
Beacon Interval		100
Distance in Meters		10000

Security	Open System
Encryption	None
Wireless Client Isolation	Disable
Access Control	Disable
SSH (Secure Shell)	Enable

SNMP	Enable/Disable	Enable
	Read Community Name	Public
	Write Community Name	Private
	IP Address	0.0.0.0

System Requirements

Before configuration, please make sure that your system meets the following requirements:

- A computer coupled with 10/ 100 Base-TX adapter;

- Configure the computer with a static IP address of 192.168.1.x, as the default IP address of SGT-LD-55-23 is 192.168.1.1, X cannot be 0, 1, nor 255;

- A Web browser on PC for configuration such as Microsoft Internet Explorer 6.0 or above or Firefox.

How to Login the Web-based Interface

The SGT-LD-55-23 provides you with user-friendly Web-based management tool.

- Open IE and enter the default IP address (Default: **192.168.1.1**) of the SGT-LD-55-23 into the address field.   A Security Alert window may popup as below, due to browser's security "trusted sites". You may choose to continue to the login webpage.

Figure 14 Security Alert

- Click "**Yes**" will usher you into the login page:

Figure 15 Login

Enter the username (Default: **admin**) and password (Default: **password**) respectively and click "**Login Now**" to login to the main page of the SGT-LD-55-23.   As you can see, this management interface provides four main options in the black bar above, which are **System, Wireless, Status and Management**

Figure 16 Main Page

Note:

- The username and password are case-sensitive, and the password is no more than 19 characters!

Basic System Setup

For users who use the SGT-LD-55-23 for the first time, it is recommended that you begin configuration from "**Basic**" in "**System**" shown below:
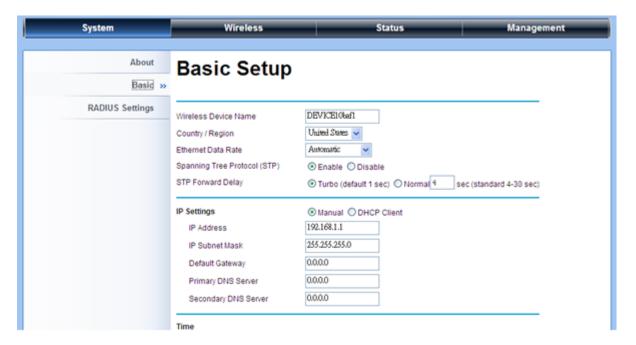
Figure 17 Basic Setup

- **Wireless Device Name**

  Specify the device name, which is composed of no more than 15 characters with (0-9), (A-Z), (a-z) or (-).

- **Country/Region**

  Since the available radio bands vary from country to country, the working channels used are different.

- **Ethernet Data rate**

  Specify the transmission rate of data.

- **Spanning Tree Protocol (STP)**

  Spanning Tree Protocol is a link management protocol for bridges which provides path redundancy while preventing loops in a network. STP allows only one active path at a time between the bridges but establishes the redundant link as a backup if the initial link fails.

- **STP Forward Delay**

  STP Forward Delay is the time spent in detecting and learning network tree topology state before entering the forwarding state. Default time value is 1 sec. Select Normal if you would like to modify the parameter (4-30 seconds).

- **VLAN**

  By enabling VLAN function, the SGT-LD-55-23 is able to operate with the VLANs set up on your VLAN network.

- **Management VLAN ID**

  You need to define a VLAN ID for your SGT-LD-55-23 to be recognized by the VLAN network.   The VLAN ID corresponds to the local ID on your Switch.

- **System Monitor**

  By enabling System Monitor, when system errors take place and are detected, a software-triggered watchdog reset occurs to resume normal operation.

- **Link Aggregation**

  Link Aggregation combines two physical network links into a single logical link for increased bandwidth.   Also, it provides load balancing.

- **IP Address**

  If you select "**Manual**", you have to specify a static IP address, subnet mask, default gateway and DNS server for your local area network which connects to the LAN port of SGT-LD-55-23.   Make sure the specified IP address is unique on your network in order to prevent IP conflict.

- **DHCP Client**

  Enable DHCP client to allow the DHCP server within your local area network to assign an IP address automatically.

Wireless Settings

Open "**Radio**" in "**Wireless**" as below and select "**RF1**" or "**RF2**" to make a basic wireless configuration on radio card 1 and 2.
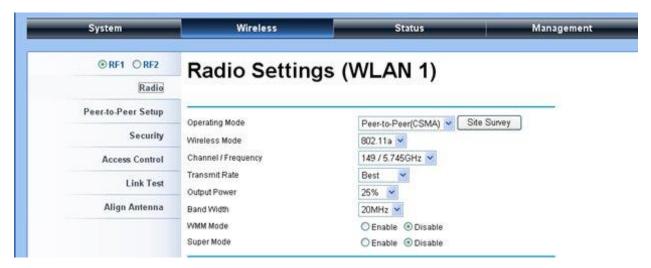
Figure 18 Basic Wireless Settings

● **Operating Mode**

Four operating modes are available on the SGT-LD-55-23. In a point to point environment where there are only two radios, Peer-to-Peer is recommended as it works more efficiently.

Base Station: The SGT-LD-55-23 connects directly to the main Ethernet LAN and receives connectivity from other wireless devices.

CPE: The SGT-LD-55-23 connects to a remote LAN and the Base Station in it.

Peer-to-Peer (CSMA): The SGT-LD-55-23 connects to another wireless device within the same networking area using the CSMA protocol.   CSMA ensures that only one node is transmitting on the network at any one time. In this mode, both PTP and PTMP are available.   It is highly recommended to use this mode when the distance between two nodes is less than 20Km.

Peer-to-Peer (TDMA): The SGT-LD-55-23 connects to another wireless device within the same networking area using the TDMA protocol. TDMA divides each cellular channel into multiple time slots to increase the amount of data that can be carried, hence increase the throughput.   In this mode, only PTP is available and it is suggested to use this mode when the distance between the two SGT-LD-55-23's is greater than 20KM.   To make the P2P TDMA work, you need to set the same Group ID on both peers.

- **Site Survey**

  Available in Base Station and CPE mode, the SGT-LD-55-23 is able to perform a site survey, through which, information on the available access points will be detected.   Open "**Basic Settings**" in "**Wireless**", by clicking the "**Site Survey**" button beside "**Wireless Mode**" option.   The wireless site survey window will pop up with a list of available wireless networks.   Select the AP you would like to connect to and click "**Selected**" to establish connection.

- **Base Station ID (SSID)**

  For Base Station mode, it requires SSID for CPU clients to associate with.   This wireless network name is shared among all associated devices in your wireless network.   Keep it identical on all those devices.   Note that the SSID is case-sensitive and cannot exceed 32 characters.

- **Wireless Mode**

  The SGT-LD-55-23 can only communicate with wireless devices using 802.11a.

- **Channel/Frequency**

  Channels varies much as the available band differs from country to country.   Select a suitable operating channel from the drop-down list according to your situation.   To avoid adjacent channel interference, it is highly suggested to separate the 2 RF link channels as much as possible.

- **Transmit Rate**

  Usually "**Best**" is preferred.   Under this rate setting, the SGT-LD-55-23 will automatically select the highest available rate to transmit.   In some cases, however, like where there is no great demand for speed, you can have a relatively-low transmit rate as a compromise for deployment of a long distance link.

- **Output Power**

  Specify the signal transmission power.   The higher the output power is, the longer distance the signal can cover, but the power consumption will be then be greater, accordingly. Usually "**100%**" is preferred.

- **Band Width**

  Four bandwidths are available: 5MHz, 10MHz, 20MHz and 40MHz.   Among them, 40MHz can enhance the data rate more effectively, but will use more bandwidth, thus cause (and be more susceptible) possible interference.

- **TDM Coordination**

  Stands for "Time-Division Multiplexing Technique", this resource reservation control mechanisms

can avoid packet collisions and send the packets much more efficiently allowing for higher effective throughput rates.   This function is only available in CSMA BS mode (RF2).   It is highly recommended to enable TDM coordination when there are multiple CPEs needing to connect to the BS in your application.

- **NoACK**

  Under TDMA mode, enabling NoACK can enhance throughput but it might result in higher error rates in a noisy environment.

- **WMM**

  WMM (Wi-Fi Multimedia) is a subset of 802.11e.   It allows wireless communication to define a priority limit on the basis of data type, thus time-sensitive data, like video/audio data, may have a higher priority than a common data type.   To enable WMM, the wireless client should also support it.

- **Super Mode**

  Super mode is an effective way to enhance performance.   It can boost the transmission data rate up to 108Mbps. To enable Super Mode, the remote SGT-LD-55-23 should also have this function enabled.   For more information you may refer to Super Mode in Chapter 4 Advance Settings.

Chapter 4 Advanced Settings

Advanced Wireless Settings

Open "**Radio**" in "**Wireless**" and look at "**Advanced Parameters**" at the bottom to make advanced wireless settings.
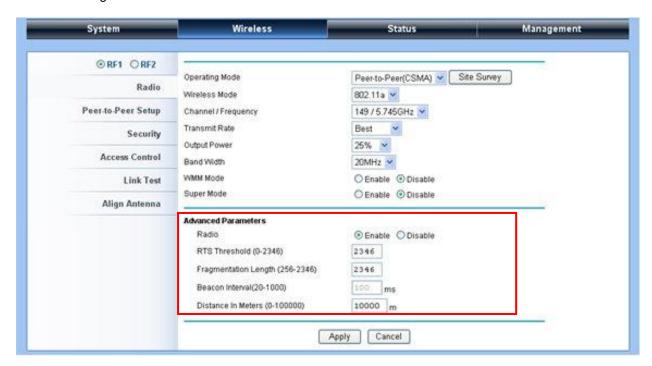
Figure 19 Advanced Parameters

- **Radio**

  To enable or disable Wireless radio interface.

- **RTS Threshold**

  The SGT-LD-55-23 sends RTS (Request to Send) frames to certain receiving station and negotiates the sending of a data frame. After receiving an RTS, that STA responds with a CTS (Clear to Send) frame to acknowledge the right to start transmission.　The setting range is 0-2346 in bytes.

- **Fragmentation Length**

  Specify the maximum size in bytes for a packet before data is fragmented into multiple packets. Setting it too low may result in poor network performance. Leaving it at its default of 2346 is recommended.

- **Beacon Interval**

  Specify the frequency interval to broadcast packets.　Enter a value between 20 and 1000.

- **Distance in Meters**

  To decrease the chances of data retransmission at long distance, the SGT-LD-55-23 can auto adjust the ACK timeout value by specifying distance between the two nodes.　Default distance is 10km. This is only useful in CSMA mode.

- **TDM Coordination Time Slice**

  Specify the time slice for TDM Coordination. It allows a certain amount of time (in ms) that data will transmit to each other before it moves to the next user. This is a repetitive cycle.

Note:

- We strongly recommended you leave most advanced settings at their default values except Distance in Meters; any modification of them may negatively impact the performance of your wireless network.

Peer-to-Peer Links

Open "**Peer-to-Peer Setup**" in "**Wireless**". Peer-to-Peer Links allow establishing of PTP or PTMP connectivity with at most eight remote wireless devices; this feature only available under Peer-to-Peer (**CSMA**) mode. Select "**RF1**", and input the MAC addresses of radio cards from the remote unit respectively. Furthermore, you may restrict the uplink speed of each peer for optimal bandwidth control.

Figure 20 Peer-to-Peer Links for CSMA

The other way to establish PTMP connectivity is to setup the same group ID under "**Radio**" in "**Wireless**". This feature is only available under Peer-to-Peer (TDMA) mode and only devices with the same Group ID can communicate.
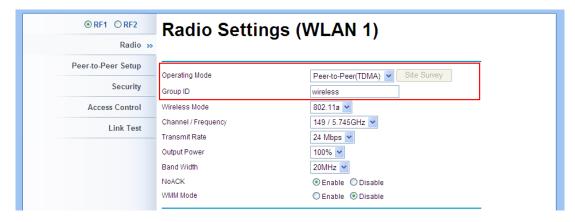
Figure 21 PTP for TDMA

Note:

- When establishing a PTMP network, make sure all the remote wireless devices are within the antenna beamwidth.

Antenna Alignment Tool

This function is available in Peer-to-Peer (CSMA) and Peer-to-Peer TDMA mode. It helps to point in the approximate direction of the remote SGT-LD-55-23 antenna and assists the user to easily align the local antenna to achieve maximum signal strength.
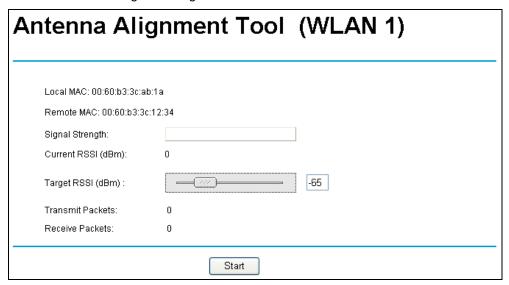
Figure 22 Antenna Alignment in CSMA

Figure 28 Antenna Alignment in TDMA

To use Antenna Alignment Tool, follow the steps bellow:

- Open "**Peer-to-Peer Setup**" and select "**RF1**" or "**RF2**". Enter the MAC address of the remote bridge and click on the **Apply** button. Then click the "**Align Antenna**" button and the "**Antenna Alignment Tool**" window will popup.

- Set the target RSSI (e.g. -70dBm) and click "**Start**" button.

- Wait about 5 seconds, the antenna alignment starts and performs alignment every one second.

- Fix the local antenna and adjust the remote antenna elevation and horizontal direction. During the

adjustment, observe "**Current RSSI**" in local SGT-LD-55-23. The value will refresh every 1 second. Fix the remote antenna when it reaches your expectation.　Usually, RSSI between -60 and -70dBm indicates rather good signal strength.

- Adjust the local antenna after fixing the remote one.　During the adjustment, observe "**Current RSSI**" in the remote SGT-LD-55-23.　Fix the local antenna when it reaches your expectation.

- When the antenna alignment tool starts, the SGT-LD-55-23 will issue a beep sound to indicate current RSSI.　Once the tool is closed the SGT-LD-55-23 will stop beeping.　Frequency of beeps indicate the following RSSI values:

Table 3 RSSI-Beep Frequency

RSSI	Beep Frequency
>-50	100 /sec
-50~-60	50 /sec
-60~-70	5 /sec
-70~-80	2 / sec
-80~-90	1 /sec
< -90	No beep sound

Link Test

Under Base Station, CPE mode when Antenna Alignment Tool is not available, Link Test provides another option to check the signal strength towards the connecting device. Open "**Link Test**" in "**Wireless**" as below, and click "**Refresh**" to view the current signal strength for wireless connectivity. The table will be updated every 3 seconds. If the signal is not so good, align the antenna manually.
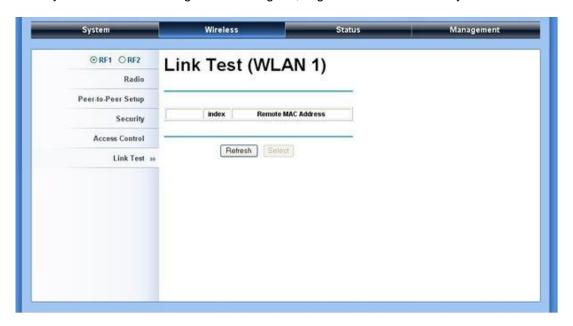
Figure 23 Link Test

Link Aggregation

Link Aggregation combines two physical network links into a single logical link for increased bandwidth. With it enabled, users can increase the capacity and availability of the communications channel between devices (both switches and end stations).   Also, link aggregation provides load balancing.

The setup procedure is as follows:

Step1. To setup link aggregation, you need a pair of SGT-LD-55-23.
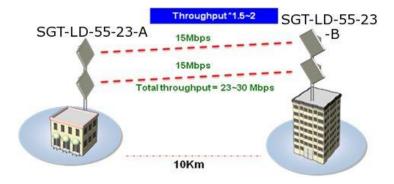
Step2. Open "**Basic**" in "**System**", Enable link aggregation.

Figure 24 Link Aggregation

Step3. Configure RF1 in SGT-LD-55-23-A to connect to its counterpart in SGT-LD-55-23-B to setup a Peer-to-Peer Link (please refer to **Peer-to-Peer Links** chapter).   For RF2, also setup a Peer-to-Peer Link with its remote counterpart.   Please note that the channels of these two links must be different to avoid interference.

Picture below is an example of link aggregation.

- **Full Duplex Two Channels:** Normally, the wireless modules in SGT-LD-55-23 receive and transmit wireless packets concurrently; if you enable link aggregation and check this box, it only transmits wireless packets on WLAN but stops receiving.   Thus the wireless performance can be enhanced

furthermore.

Note:

- Link aggregation takes effect only when both cards work in Peer-to-Peer (CSMA) or Peer-to-Peer (TDMA) mode.

Super Mode

Available in Bridge (CSMA), Base Station and CPE mode, Super Mode is an effective way to enhance throughput performance.   It can boost the transmission data rate up to 108Mbps.   To enable Super Mode, the remote terminal should also have the function enabled.   Note that this function should only be activated if all of the wireless devices share the same wireless connectivity (i.e. all must support Super mode).   (The throughput may vary depending on the actually environment and data traffic flow).

Open "**Radio**" in "**Wireless**", Super Mode is as below:
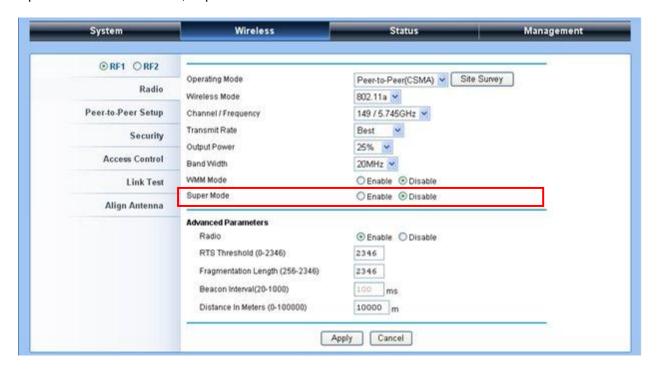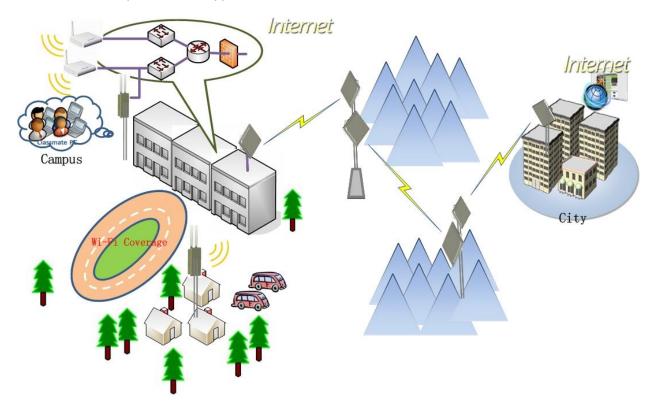
Figure 25 Super Mode

Note:

- Note that this function should only be activated if all of the wireless devices share the same wireless connectivity.
- The throughput may vary depending on the actually environment and data traffic flow.

Repeater

The SGT-LD-55-23 can be used as a repeater to increase the communication distance.　Please refer to picture below.　The SGT-LD-55-23 has two RF modules.　Each RF module gets setup as a Peer-to-Peer link (please refer to **Peer-to-Peer Links** chapter), connecting to the remote devices in different direction respectively.　In this way, the communication distance will be doubled. Please note that an external antenna is also required for this application.

There is an interface with a blue cover for an external antenna on the equipment cover.

Wireless Security Settings

To prevent unauthorized radios from accessing data being transmitted, the SGT-LD-55-23 provides you with rock-solid security settings.

Security Profile Configuration

Open "**Security**" in "**Wireless**" as below:

Figure 26 Security

● **Broadcast SSID**

Hiding network name is necessary when you are in a wireless environment that may have potential risk. By using this function, potential hostile STA cannot scan and find a SGT-LD-55-23, so that malicious attacks by some illegal STA can be avoided.

● **Network Authentication**

Open: It allows any device to join the network without performing any security check.

Shared Key: Data encryption and key are required for wireless authentication before association. (Only available in BS and CPE mode)

WPA-PSK: It is a simplified WPA mode with no need for a specific authentication server.   In this so-called WPA Pre-Shared Key mode, all you have to do is pre-enter a key in each WLAN node - this is a common method adopted in large and mid-sized enterprises and residential networks.

WPA2-PSK: As a new version of WPA, only if all of the clients support WPA2, can it be available. If it

is selected, the data encryption can only be AES and the passphrase is required.

WPA-PSK&WPA2-PSK: It provides options of WPA (TKIP) or WPA2 (AES) encryption for the client. If it is selected, the data encryption can only be TKIP + AES and the passphrase is required.

- **Data Encryption**

  If data encryption is enabled, the key is required and only through sharing the same key with other wireless devices can the communication be established.

  None: Available only when the authentication type is open system.

  64 bits WEP: It is made up of 10 hexadecimal numbers.

  128 bits WEP: It is made up of 26 hexadecimal numbers.

  TKIP: Temporal Key Integrity Protocol, which is a kind of dynamic encryption, is co-used with WPA-PSK, etc.

  AES: Advanced Encryption Standard, it is usually co-used with WPA2-PSK.

  TKIP + AES: It allows for backwards compatibility with devices using TKIP.

- **Wireless Client Isolation Mode**

- Enabling this mode can prevent the communication between connected wireless clients.

Note:

- We strongly recommend that you enable wireless security on your network!
- Only by setting the same Authentication, Data Encryption and Key in the SGT-LD-55-23 and other wireless devices that connect with it, can the communication be established!

Access Control

The Access Control allows a STA to access a SGT-LD-55-23; thus, a further security mechanism is provided.   This function is available only under Base Station mode.

Open "**Access Control**" in "**Wireless**" as below, check "**Turn Access Control On**" to enable this function.

Figure 27 Access Control

- **Available CPEs**

  This table lists the CPE's currently connecting to the SGT-LD-55-23.   Check the box before each MAC address, click "**Add**" to add one or more available CPE(s) into the "**Trusted CPEs**" and click "**Apply**" to save settings.

- **Add New CPE Manually**

  Enter the MAC address of the CPE that you would like to list into the access control list, click "**Add**", then the CPE will be added into the "**Trusted CPEs**".

- **Trusted CPEs**

  Check the box before one or more MAC addresses of CPEs that you would like to cancel and click "**Delete**" to cancel that access control rule.

RADIUS Settings

RADIUS (Remote Authentication Dial-In User Service) is a server for remote user authentication and accounting; RADIUS plays a central role in the network for providing the capabilities of authenticating, authorizing, accounting, auditing, alarming and etc.   It allows an organization to maintain user profiles in a central database that all remote servers can share.

Open "**RADIUS Settings**" in "**System**" to make RADIUS configuration.
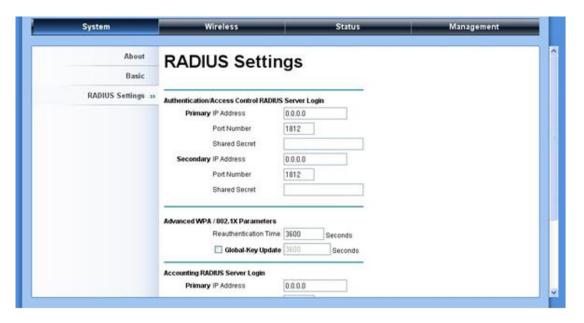
Figure 28 RADIUS Settings

- **Authentication/Access Control RADIUS Server Login**

  This is for RADIUS authentication. It can communicate with RADIUS through IP Address, Port Number and Shared Secret.   If the Primary RADIUS fails to work, the Secondary RADIUS Server is an option.

  IP Address: Enter the IP address of the Radius Server;

  Port Number: Enter the port number of the Radius Server;

  Shared Secret: This secret, which is composed of no more than 31 characters, is shared by the SGT-LD-55-23 and RADIUS during authentication.

- **Advanced WPA/802.1X Parameters**

  Re-authentication Time: Set the time interval between two authentications.

  Global-Key Update: Check this option and specify the time interval between two global-key updates.

Chapter 5 Management

View SGT-LD-55-23 Basic Information

Open "**About**" in "**System**" to check the basic information of SGT-LD-55-23, which is read-only.
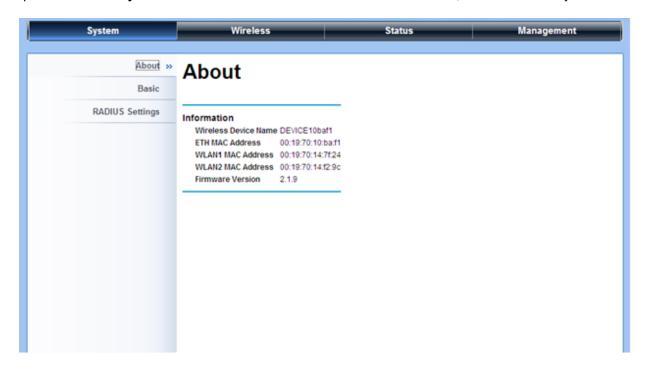
Figure 29 Basic Information

View Ethernet Statistics

Open "**Ethernet Status**" in "**Status**" to check the data packets received on and transmitted from the Ethernet port in LAN. Click "**Refresh**" to view current statistics. All are read-only.
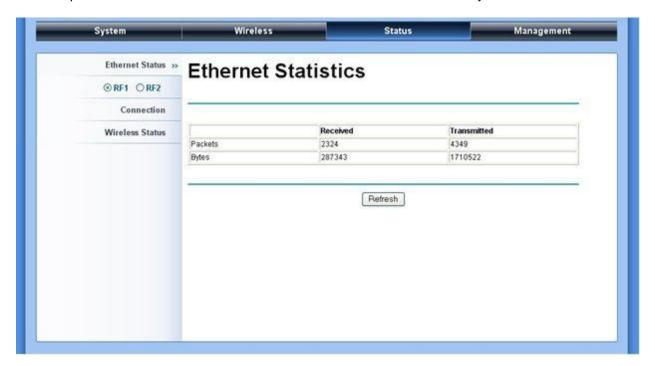
Figure 30 Ethernet Statistics

View Wireless Statistics

Open "**Wireless Status**" in "**Status**" to check the data packets received on and transmitted via wireless network. Click "**Refresh**" to view current statistics. All are read-only.
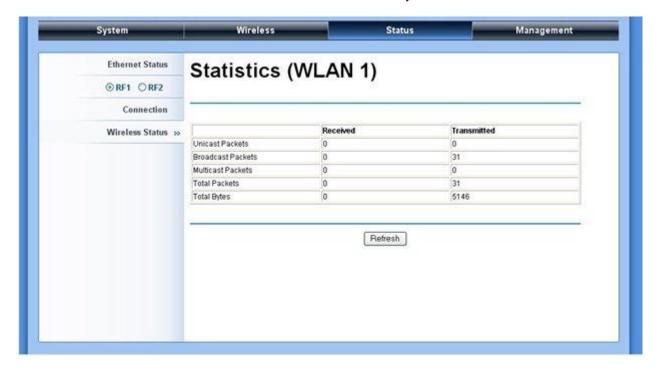
Figure 31 Wireless Statistics

Connection

Open "**Connection**" in "**Status**" to check the information of remote CPE's connected to the SGT-LD-55-23, these values also help determine if the antenna is aligned in an appropriate direction. The table will be updated every 30 seconds. All are read-only.

Figure 32 Connection

Password

From "**Change Password**" in "**Management**", you can change or default the password to manage your SGT-LD-55-23.

Figure 33 Password

- **Change Password**

   For security purposes, you have to enter the current password first and then enter the new one twice respectively in the "**New Password**" and "**Repeat New Password**" fields.

- **Restore Default Password**

   If you would like to restore the default password, enter the current password first and then check "**Yes**" and click "**Apply**" to default the password.

✎**Note:**

- The password is case-sensitive and its length cannot exceed 19 characters!

Remote Management

The SGT-LD-55-23 provides you with two more options for device management, which are SSH (Secure Shell) and SNMP.

Open "**Remote Management**" in "**Management**" to configure the remote management of the SGT-LD-55-23.

Figure 34 Remote Management

Remote Console

The SGT-LD-55-23 supports CLI management, which can be accessed by Secure Shell (SSH). It is recommended that PuTTY be used to login. Download it from http://www.putty.org/ for free. The minimum system requirement for using PuTTY is Windows 95, 98, ME, NT, 2000, XP and Vista on Intel x86.

Follow the steps below to implement:

● Once the program is downloaded, open up by double-clicking putty.exe; Note that before using PuTTY, be sure that you are able to connect to the SGT-LD-55-23.

- Enter IP Address of SGT-LD-55-23 (Default: **192.168.1.1**), Port (22) and check SSH as connection type;
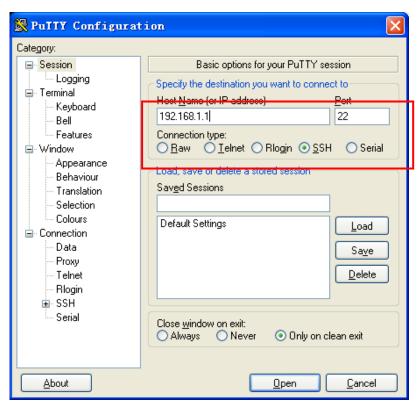
Figure 35 PuTTY Configuration 1

- From "**Connection**" in the left menu bar, click "**SSH**"; select "**2**" as "**Preferred SSH protocol version**"; make "**3DES**" the top position in "**Encryption cipher selection policy**";
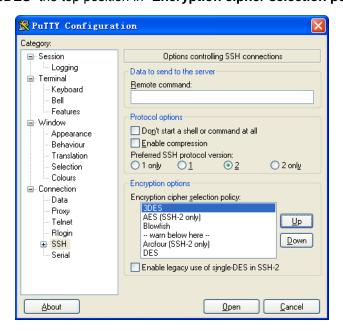
Figure 36 PuTTY Configuration 2

- Click "**Open**", a window as below will popup:

Figure 37 SSH

- Enter the user name and password (Default user name/ password: admin/password) respectively, you will see "**DEVICE123456>**", which is the name of SGT-LD-55-23;

- Enter "**help**" command to get setting information; alternatively, you can refer to Appendix C. SSH Settings for details.

SNMP

The SGT-LD-55-23 supports SNMP management. Set the SNMP parameters and obtain MIB file before remote management.

- From "**Remote Management**" in "**Management**", set the parameters for SNMP:

  - Enable SNMP by checking "**Enable**";

  - Specify the "**Read Community Name**", "**Write Community Name**" and "**IP Address to Receive Traps**"

  - Hit "**Apply**" to save settings.

- Obtain the MIB file via FTP:

  - Enter ftp 192.168.1.1 , username (Default: admin) and password (Default: password);

  - After successful login, enter command "**get bridge.mib**", the information will as below and then bridge.mib file is obtained.

Figure 38 Obtain MIB File

Time Settings

Compliant with NTP, the SGT-LD-55-23 is capable of keeping its time in complete accord with the Internet time.   Make configuration in "**Basic**" from "**System**":
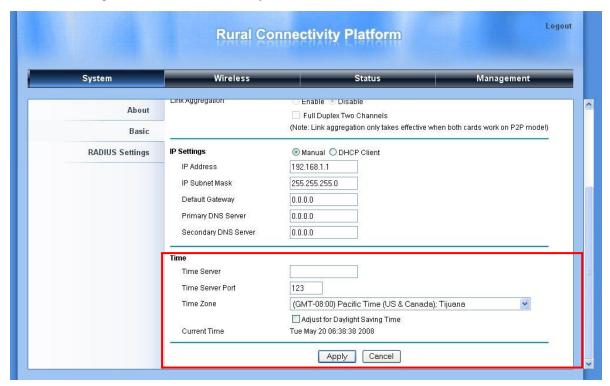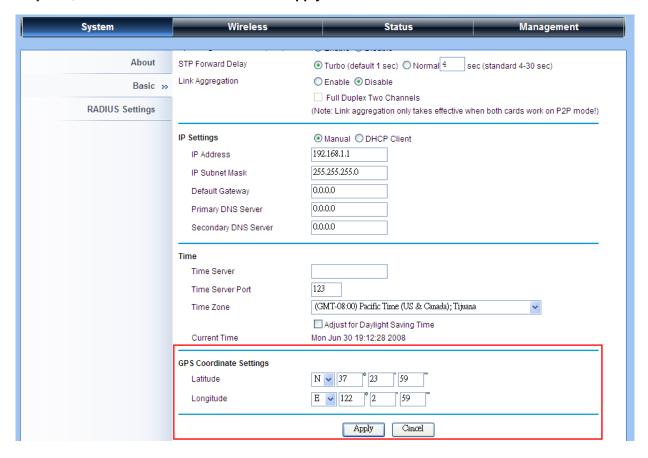
Figure 39 Time Settings

- Enter the time server IP address and port respectively in "**Time Server**" and "**Time Server Port**" fields;

- Select your desired time zone from the drop-down list, check "**Adjust for Daylight Saving Time**" if necessary;

- Hit "**Apply**" to save settings.

GPS Coordinate Settings

The GPS Coordinate Setting helps you mark the latitude and longitude of the SGT-LD-55-23.   From Basic in System, enter the coordinates and click the **Apply** button.

Upgrade Firmware

Open "**Upgrade Firmware**" in "**Management**" and follow the steps below to upgrade firmware locally or remotely through SGT-LD-55-23's Web:

Figure 40 Upgrade Firmware

- Click "**Browse**" to select the firmware file.

- Click "**Upload**" to load the file into the SGT-LD-55-23.

- Wait a moment, the system will reboot after successfully upgrade.

Warning:

- Do NOT cut the power off during upgrade, otherwise the system may crash!

- Upgrading with the wrong firmware will make your device useless. Please carefully check the firmware before upgrading.

Backup/Restore Settings

It is strongly recommended to back up configuration information in case of something unexpected. If an unforeseen problem hits your device, you may have access to restore the important files by the backup. All these can be done by the local or remote computer.

Open "**Backup/Restore Settings**" in "**Management**" as below:

Figure 41 Backup/Restore Settings

- **Backup Settings**

  By clicking "**Backup**" a dialog box will popup. Save it, then the configuration file is saved to your local computer.

- **Retrieve Settings**

  By clicking "**Browse**" a file selection menu will appear, select the file you want to load, like bridge.cfg; Click "**Retrieve**" to load the file. After automatically rebooting, new settings are applied.

Restore Factory Default Settings

The SGT-LD-55-23 provides two ways to restore the factory default settings:

- **Restore factory default settings via Web**

    From "**Backup/Restore Settings**", clicking "**Restore**" will eliminate all current settings and reboot your device, then default settings are applied.

Figure 42 Restore Settings

- **Restore factory default settings via RS-232**

    If software in SGT-LD-5-23 has unexpectedly crashed and you can no longer reset the unit via the Web interface, you may do a hardware reset via RS-232.   For detailed instructions please refer to the Chapter 2 RS-232 section.

Event Log

Event log is used for recording events occurring in the SGT-LD-55-23, including station connection, disconnection, system reboot etc.

Open "**Event Log**" in "**Management**" as below.
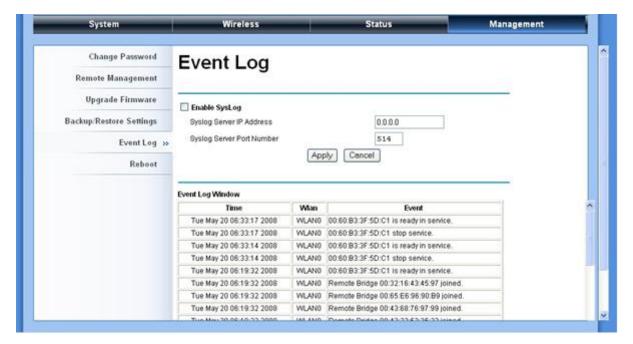
Figure 43 Event Log

- Enable Log: Enable System log or not;

- Syslog Server IP Address: Specify the IP address of the server;

- Syslog Server Port Number: Specify the port number of the server;

- Hit "**Apply**" to save settings;

- Event Log Window: Lists all occurred events in this field.

Reboot

You can reboot your device from "**Reboot**" in "**Management**" as below:
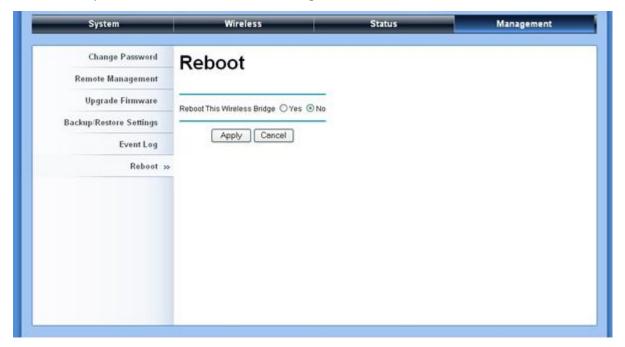
Figure 44 Reboot

• Check "**Yes**" and click "**Apply**" to reboot the SGT-LD-55-23. This takes a few minutes, during which the device will send out the buzzing sound, informing you that the system is rebooting.

Chapter 6 Troubleshooting

This chapter provides troubleshooting procedures for basic problems with the SGT-LD-55-23. For warranty assistance, contact your service provider or distributor for the process.

Q 1. What if my SGT-LD-55-23 fails to connect to the remote one?

- **Ethernet Link**: Check the availability of power to the bridge by observing the LED status on the power injector or on top of the RJ-45 Jack of the unit.

  - Green: The SGT-LD-55-23 is connecting to the backhaul network.

  - Off: The SGT-LD-55-23 disconnects from the wired network, check if the power cord and Ethernet cables to the network and bridge are correctly connected.

- **Basic Configurations**: Mismatched basic settings among bridges are the most common cause of connectivity failure. If the bridge does not associate with a remote bridge, check that options in each device are identical.

- **Security Settings**: Remote bridges attempting to authenticate to your bridge must support the same security options configured in your bridge, such as WEP and WPA (2)-PSK. If your bridge fails to associate with others, check that the security settings are the same as your bridge settings.

- **Antenna Alignment**: If the methods above are all checked to be correct, you can observe and verify antenna alignment with RSSI value.

Q 2. What if I would like to reset the unit to default settings?

You may restore factory default settings in "**Backup/Restore Settings**" from "**Management**"

Q 3. What if I would like to backup and restore my configuration settings?

You may do the backup by generating a configuration file or retrieve the settings you have backed up previously in "**Backup/Restore Settings**" from "**Management**".

Q 4. What if I can not open the Web-based management interface?

Please check the followings:

- Check if the power supply is OK; Try to power on the unit again.

- Check if the IP address of PC is correct (in the same network segment as the unit);

- Log into the unit via other browsers such as Firefox.

- Hard reset the unit.

Q 5. What if the signal quality is poor or not so good?

- Check if there is an obstacle between units. An obstacle may result in a weak receive signal level.

- Check the antenna height. Place the unit in a high position can help to get a better communication for long distance transmission.

- Check the polarization direction of antenna. Keep the polarization direction of antennas for two associating units the same; if not (one is horizontal, another is vertical), the signal quality may reduce dramatically.

- Check the antenna angle. Align the antenna to the remote one if using a directional antenna. A large angle shift may lead to a poor signal.

- Check the feeder length. Too long a feeder may increase the signal loss and affect the unit's performance.

Appendix A. Channel – Frequency Table

The SGT-LD-55-23 can be operated in four different bandwidths, which are 5MHz, 10MHz, 20MHz and 40MHz.   The following tables illustrate the channels with corresponding frequency in each bandwidth.

Table 4 Channels in 5MHz Centre Frequency

Channel	Frequency
149	5.745 GHz
150	5.750 GHz
151	5.755 GHz
152	5.760 GHz
153	5.765 GHz
154	5.770 GHz
155	5.775 GHz
156	5.780 GHz
157	5.785 GHz
158	5.790 GHz
159	5.795 GHz
160	5.800 GHz
161	5.805 GHz
162	5.810 GHz
163	5.815 GHz
164	5.820 GHz
165	5.825 GHz

Table 5 Channels in 10MHz Centre Frequency

Channel	Frequency
149	5.745 GHz
151	5.755 GHz
153	5.765 GHz
155	5.775 GHz
157	5.785 GHz
159	5.795 GHz
161	5.805 GHz
163	5.815 GHz
165	5.825 GHz

Table 6 Channels in 20MHz Centre Frequency

Channel	Frequency
149	5.745 GHz
153	5.765 GHz
157	5.785 GHz
161	5.805 GHz
165	5.825 GHz

Table 7 Channels in 40MHz Centre Frequency

Channel	Frequency
149	5.745GHz
157	5.785GHz
165	5.825GHz

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.

Appendix B. Channel – Country List Table

The SGT-LD-55-23 support country selection; there are different channels when selecting different countries. The following tables list the channel with country code in each bandwidth.

Table 8 Country of FCC

Country	Mode	Channel list			
		40Mhz	20Mhz	10Mhz	5Mhz
United States	11bg (1-11)	6	1/2/3/4/5/6/7/8/9/10/11	1/2/3/4/5/6/7/8/9/10/11	1/2/3/4/5/6/7/8/9/10/11
	11a (5725～5850)	149/157/165	149/153/157/161/165	149/151/153/155/157/159/161/163 165	149/150/151/152/153/154/155/156/157/158/159/160/161/162/163/164/165

Table 9 Country of European Union

Country	Mode	Channel list			
		40Mhz	20Mhz	10Mhz	5Mhz
Belgium	11bg (1-13) *Ukraine Excluded CH12-CH13	6	1/2/3/4/5/6/78 /9/10/11/12/13	1/2/3/4/5/6/7/8 9/10/11/12/13	1/2/3/4/5/6/7/8 9/10/11/12/13
Bulgaria					
Croatia					
Cyprus					
Czech Republic					
Estonia					
Finland					
F.Y.R.O.Macedonia					
France	11a (5470～5725) Excluded CH120~CH131 Meteorology Radars	100/108/116 140	100/104/108/112 116/136/140	100/102/104/106/ 108/110/112/114/ 116/118/134/136/1 38/140	100/101/102/103/ 104/105/106107/ 108/109/110/111/ 112/113/114/115/ 116/117/118/119/ 133/134/135/136/ 137/138/139/140/ 141
Germany					
Greece					
Hungary					
Iceland					
Italy					
Latvia					
Lithuania					
Luxembourg					
Malta					
Netherlands					
Poland					
Portugal					
Romania					
Slovakia					
Slovenia					
Spain					
Sweden					
Turkey					
South Africa					
Nigeria					
Russia					
*Ukraine					
Austria					

Table 10 Other Countries

Country	Mode	Channel list			
		40Mhz	20Mhz	10Mhz	5Mhz
	11bg	6	1/2/3/4/5/6/7/8/9/10/11/12/13	1/2/3/4/5/6/7/8/9/10/11/12/13	1/2/3/4/5/6/7/8 9/10/11/12/13
	11a (5470~5725) Excluded CH120~CH131 Meteorology Radars	100/108/116/140	100/104/108/112/116/136/140	99/101/103/105/107/109/111/113/115/117/119/133/135/137/139/141	99/100/101/102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/133/135/136/137/138/139/140/141
*Ireland Liechtenstein Norway Switzerland Denmark	(5725~5875) Excluded 5795~5815	151/167	147/151/155/167/171	146/148/150/152/154/156/158/164/166/168/170/172/174	146/147/148/149/150/151/152/153/154/155/156/157/158/164/165/166/167/168/169/170/171/172/173/174
	*Ireland Excluded 5795~5805	151/167	147/151/155/163/167/171	146/148/150/152/154/156/158/162/164/166/168/170/172/174	146/147/148/149/150/151/152/153/154/155/156/157/158/162/163/164/165/166/167/168/169/170/171/172/173/174

	11bg (1-13)	6	1/2/3/4/5/6/7/8/9/ 10/11/12/13	1/2/3/4/5/6/7/8 9/10/11/12/13	1/2/3/4/5/6/7/8 9/10/11/12/13
UK	11a (5470~5725) Excluded CH120~CH131 Meteorology Radars	100/108/ 116/140	100/104/108/112/ 116/136/140	99/101/103/105 /107/109/111/113 /115/117/119/133/ 135/137/139/141	99/100/101/102 /103/104/105/106 /107/108/109/110 /111/112/113/114 /115/116/117/118 /119/133/135/136 /137/138/139/140 /141
	(5725~5850) Excluded 5795~5815	151/167	147/151/155/167	146/148/150/152 /154/156/158/164 /166/168	146/147/148/149/ 150/151/152/153/ 154/155/156/157/ 158/162/163/164/ 165166/167/168/ 169

Appendix C. ASCII

WEP can be configured with a 64-bit or 128-bit Shared Key (hexadecimal number or ACSII). As defined, hexadecimal number is represented by 0-9, A-F or a-f; ACSII is represented by 0-9, A-F, a-f or punctuation. Each one consists of two-digit hexadecimal.

Table 11 ACSII

ASCII Character	Hex Equivalent	ASCII Character	Hex Equivalent	ASCII Character	Hex Equivalent	ASCII Character	Hex Equivalent
!	21	9	39	Q	51	i	69
"	22	:	3A	R	52	j	6A
#	23	;	3B	S	53	k	6B
$	24	<	3C	T	54	l	6C
%	25	=	3D	U	55	m	6D
&	26	>	3E	V	56	n	6E
'	27	?	3F	W	57	o	6F
(	28	@	40	X	58	p	70
)	29	A	41	Y	59	q	71
*	2A	B	42	Z	5A	r	72
+	2B	C	43	[	5B	s	73
,	2C	D	44	\	5C	t	74
-	2D	E	45	]	5D	u	75
.	2E	F	46	^	5E	v	76
/	2F	G	47	_	5F	w	77
0	30	H	48	`	60	x	78
1	31	I	49	a	61	y	79
2	32	J	4A	b	62	z	7A
3	33	K	4B	c	63	{	7B
4	34	L	4C	d	64			7C
5	35	M	4D	e	65	}	7D
6	36	N	4E	f	66	~	7E
7	37	O	4F	g	67		
8	38	P	50	h	68		

Appendix D. SSH Settings

Table 12 SSH Settings

get	set	del	Keyword				Descriptions
√	√		time				--time setting
√				-now			--current system time
√	√			-zone			--time zone
√	√			-daylight saving			-- daylight saving
√	√			-server			--time server setting
√	√				-name		--time server (domain name or IP address)
√	√				-port		--time server port
√	√		system				--system setting
√				-version			--system firmware version
√	√			-devicename			--system name
√				-macaddr			--system MAC address
√	√			-country			--country/region
	√			-restoreFactory Default			-- restore factory default
√	√			-iptype			--system dhcp client
√	√			-ipaddr			--system IP address
√	√			-netmask			--system network mask
√	√			-gateway			--system gateway
√	√			-dns			--system dns
√	√				-primary		-- primary system DNS server
√	√				-secondary		-- secondary system DNS server
√	√			-stp			--enable spanning tree protocol
√	√			-linkaggr			--enable link aggregation
√	√			-linkaggrfixtran smit			--fix transmit on a wlan
√	√			-ethrate			--ethernet data rate
√				-ethstats			--ethernet statistics
√	√		radius				--radius settig
√	√			-auth			--authentication radius setting
get	set	del	Keyword				Descriptions
√	√				-primary		-- primary

get	set	del	Keyword				Descriptions
√	√					-ipaddr	-- radius IP address
√	√					-port	-- radius port number
√	√					-secret	-- radius secret string
√	√				-secondary		-- secondary
√	√					-ipaddr	-- radius IP address
√	√					-port	-- radius port number
√	√					-secret	-- radius secret string
√	√	√		-wpa			--wireless WPA setting
√	√				-reauthtime		-- wireless WPA re-auth period(in seconds)
√	√				-keyupdate		-- enable wireless WPA global update condition
√	√					-mode	-- wireless WPA global key update condition
√	√					-interval	-- wireless WPA global key update interval
√	√			-account			--account radius setting
√	√				-primary		-- primary
√	√					-ipaddr	-- radius IP address
√	√					-port	-- radius port number
√	√					-secret	-- radius secret string
√	√				-secondary		-- secondary
√	√					-ipaddr	-- radius IP address
√	√					-port	-- radius port number
√	√					-secret	-- radius secret string
√	√		ssh				--enable remote SSH access
√	√		snmp				--SNMP setting
√	√			-server			--enable SNMP agent
√	√			-trap server			--SNMP TrapServer IP address
√	√			-read community			--SNMP ReadCommunity
√	√			-write community			--SNMP WriteCommunity
√	√		log				--syslog setting
√	√			-client			--enable syslog client
√	√			-ipaddr			--syslog server IP address
get	**set**	**del**	**Keyword**				**Descriptions**
√	√			-port			--syslog server port number
√	√		wlan				--wireless setting

get	set	del	Keyword			Descriptions
√	√		-wirelessmode			--wireless mode
√	√		-channel			--wireless channel(depends on country and wireless mode)
√	√		-txrate			--wireless transmission data rate
√	√		-bandwidth			-- wireless bandwidth
√	√		-cpe mode			--use multicli or lan-to-lan
√	√		-cpedownflowwidth			-- wireless down flow width for CPE mode
√	√		-OutputPower			--wireless transmit power
√	√		-VQoS/TDM			--enable TDM mode or not
√	√		-tdm timeslice			--station's timeslice value
√	√		-fragmentationthreshold			--wireless fragmentation threshold(even only)
√	√		-rtsthreshold			--wireless RTS/CTS threshold
√	√		-beaconinterval			-- wireless beacon period in TU (1024us)
√	√		-operating mode			-- wireless operation mode
√	√	√	-remotebs			--wireless remote AP(s)(depends on operation mode)
√	√	√		-pxp		--remote AP address for pxp mode
√	√				-wirelessisolate	--pxp wirelessisolate
√	√	√			-1	--1st remote AP for pxp mode
√	√	√			-macaddress	-- remote AP mac address for pxp mode
√	√				-bandwidth	--down flow width for pxp mode
√					-status	--remote AP status or active for pxp mode
get	**set**	**del**	**Keyword**			**Descriptions**
√					-ipaddr	-- remote AP ipaddr

get	set	del	Keyword				Descriptions
√						-rssi	-- remote AP rssi
√	√	√				-2	--2nd remote AP for pxp mode
√	√	√				-macaddress	-- remote AP mac address for pxp mode
√	√					-bandwidth	--down flow width for pxp mode
√						-status	--remote AP status or active for pxp mode
√						-ipaddr	-- remote AP ipaddr
√						-rssi	-- remote AP rssi
√	√	√				-3	--3rd remote AP for pxp mode
√	√	√				-macaddress	-- remote AP mac address for pxp mode
√	√					-bandwidth	--down flow width for pxp mode
√						-status	--remote AP status or active for pxp mode
√						-ipaddr	-- remote AP ipaddr
√						-rssi	-- remote AP rssi
√	√	√				-4	--4th remote AP for pxp mode
√	√	√				-macaddress	-- remote AP mac address for pxp mode
√	√					-bandwidth	--down flow width for pxp mode
√						-status	--remote AP status or active for pxp mode
√						-ipaddr	-- remote AP ipaddr
√						-rssi	-- remote AP rssi
√	√	√		-acl			--wireless access control
√	√				-mode		--enable wireless access control(ACL)
√	√	√			-list		--display trusted CPEs
	√				-all		--(delete only)all local ACL address
get	**set**	**del**	**Keyword**				**Descriptions**
√	√	√				-(null)	--edit local ACL address
√				-association			--list of associated wireless clients
√				-wlanstats			--wlan statistics
√	√	√		-key			--wireless wep key setting

get	set	del	Keyword				Descriptions
√	√				-type		-- wireless wep key type
√	√	√			-1		-- wireless wep key 1
√	√	√			-2		-- wireless wep key 2
√	√	√			-3		-- wireless wep key 3
√	√	√			-4		-- wireless wep key 4
√	√			-spaceinmeter			--wireless space in meter
√	√	√		-remotebssid			--wireless remote bssid in cpe mode
√	√			-remotessid			-- wireless remote ssid in cpe mode
√				-network-status			--wireless network status
√				-bsscanlist			--bs list
√				-signal level			-- signal level(dBm)
√				-remoterssi			--remote bs and rssi
√	√			-wmm			--wmm settngs
√	√			-super_audio			--Fast_Frame settings
√	√			-super_video			--super burst settings
√	√			-super_picture			--compression settings
√	√	√		-bs			--<null>
√	√				-ssid		--network name of this bs(1-32 chars)
√	√				-hiddenssid		--bs ssid broadcast suppress
√	√				-wirelessisolate		-- bs isolate communication between clients
√	√				-authentication		--bs authentication type
√	√				-encryption		--bs data encryption
√	√				-default		---
√	√	√			-psk		--bs pre-shared key(PSK) for WPA-PSK or WPA2-PSK
√	√			-autowdsenable			--auto wds settings
√	√			-wdsgroupid			--wds group id name
get	**set**	**del**	**Keyword**				**Descriptions**
			password				--system password
			reboot				--reboot system
			exit				--logout from CLI
			quit				--quit CLI

Appendix E. GPL Declamation

PUBLIC SOFTWARE DECLAMATION

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